RECENT LITERATURE.

The genus Salpa.[1]—The Johns Hopkins Press has issued the second of the series of "Morphological Monographs," in the shape of a magnificent treatise on the genus Salpa by Professor W. K. Brooks. The monograph is an exhaustive one, without which no working library can afford to remain. It includes a brief but valuable survey of the anatomy of many species, a detailed account of the development of the solitary form from the egg, and of the chain Salpa from the stolon. The systematic position of Salpa with reference to other tunicates is discussed, and this leads the author to a wide biological consideration of the primitive pelagic fauna and the origin of the Metazoa. The evidence on the origin of the Chordata, to be gathered from the tunicates, is presented and is shown to be in opposition to the annelidian hypothesis of the derivation of this group. Dr. M. M. Metcalf contributes the final section, a careful study of the eyes and subreural gland of Salpa.

The chapter on the egg development of the solitary Salpa is especially interesting and suggestive. An outline of this remarkable development is as follows: The germ mass is present in the embryo of the solitary form, and extends into the stolon as the latter grows out. It is differentiated into a superficial epithelium and an inner mass of ovarian ova, which in the mature stolon form a single row. When the stolon is constricted to form the chain of salps, each Salpa body gets its particular portion of the elongated germ mass. In most species this consists of a single egg with its surrounding epithelium. The latter is differentiated into testes, follicle, and fertilizing duct, i. e. a tube attaching the egg to the dorsal wall of the chain salp, through which the spermatozoa pass to reach the egg—the egg itself lies in a blood sinus of the chain salp. It is evident from these facts that the alternation of generations in Salpa differs from the typical alternation of generations, in that the solitary form does not arise from the chain Salpa, but from an egg passed into the chain Salpa from the preceding generation of the solitary form.

As the embryo grows, it pushes out of the blood sinus in which it lies at first, into the cavity of the cloaca, driving the wall of the cloaca before it. From the dorsal wall a complicated system of covering

[1]The genus Salpa, by William K. Brooks. Baltimore, The Johns Hopkins Press, 1893.

embryonic membranes is formed. The inner end of the embryo remains exposed to the blood sinus of the chain salp, and from it the placenta is formed. The placenta of Salpa is fundamentally different from that of the Mammalia. It is merely a portion of the embryonic body through which the blood of the chain salp circulates. It appears to be exclusively a nutritive organ, not respiratory. The stream of water constantly passing through the cloaca of the chain salp and bathing the body of the embryo, makes a special respiratory organ unnecessary. The placenta performs its nutritive function in a way very different from that of the corresponding mammalian organ. In Salpa the placental blood current nourishes the placenta itself and causes the cells to multiply. The latter migrate into the body cavity of the embryo, where they degenerate and are used as food.

The very remarkable character of the egg development is due to the peculiar behavior of the follicle. During the segmentation of the egg, the follicle undergoes a considerable increase in size. Its cells proliferate and the follicle assumes a shape, which may be likened to that of a mature Graafian follicle of the vertebrate ovary. That is, there is a superficial (or somatic) layer of the follicle, connected over a small area with a central mass (visceral layer), the two elsewhere separated by a cavity. The blastomeres, which are forced apart by the growth of the follicular tissue, lie in the visceral layer and the region where visceral and somatic layers are connected. The follicle now proceeds to develop, as if it were going to form the embryo, while the blastomeres remain few in number, scattered about in the midst of the mass of follicular tissue. It is impossible without figures to explain the way in which the follicular tissue is folded and hollowed out, to form the various parts of what appears to be the embryo. It may be said in a word that the follicular tissue gives rise to a body, which is a "simulacrum of the embryo." In this body, pharynx, cloaca, gill and gill-slits, are all developed, but are lined with the follicular cells of which the great mass of the body is composed. As the various organs are outlined in the follicular tissue, the blastomeres take up certain more or less definite positions with reference to each organ. Finally the blastomeres begin a rapid growth, and in each organ and throughout the body they take the place of the follicle cells, the latter degenerating and being ultimately used up as food. Thus in fact the Salpa embryo, like that of other animals, is derived from the egg cell and not from the follicle, as some investigators have held.

Professor Brooks suggests an explanation, which is probably the true one, of the behavior of the follicle in the Salpa embryo. It is well known that in many tunicates the follicle cells migrate in between

the blastomeres, more or less completely surrounding the latter, in which position they are finally used up as food. And the peculiar behavior of the follicle in Salpa is probably to be explained on the theory that Salpa has had an ancestor in which the follicular tissue persisted late in the development, and was so accurately disposed around and between the organs as to form what might be called a cast of the embryo.

In the modern Salpa, as in the hypothetical ancestor, the follicular tissue develops into a cast of the embryo, but the blastomeres instead of leading the way as they doubtless did in the ancestral embryology, are now so retarded in their development that they do not begin to build up the embryonic organs until the follicular cast is well nigh completed. H. V. WILSON.

Bateson's Dictionary of Variaton.[1]—In this work the author has collected a great many examples of variations from normal structures found in animals. These include both absolute abnormalities and variations which are in the line of evolution. The work is a useful one to all zoologists aud students of evolution, as furnishing examples of variation in groups with which they are not personally familiar. It will, however, not take the place with any specialist of his knowledge of the subject matter of his own studies. It is not to be supposed that its author intended that it should. A dictionary of variation of all animals would be a detailed work on zoology in general, where the normal characters of all species should be stated, in order that it might be shown what constitutes variation. Such a work could only be produced by the cooperation of a large number of "species naturalists." Embryologists and histologists would be wholly unfit for the task. Perhaps it was a sense of this deficiency which led Mr. Bateson to prepare this work; for otherwise it is difficult to imagine why an expert in any branch of zoological sciences should attempt the task, unless it should be designed for amateurs and general readers. While preparing the work, its author neglected one of the richest mines of information as to normal variation. This is found in the writings of American specialists in vertebrate zoology, where the subject has been treated in greater detail, and with greater wealth of material than exists in the literature of any other country. The book is well illustrated, which greatly enhances its value. We recommend it for study to persons who are doubtful in their opinions on the subject of organic evolution.

[1]Materials for the Study of Variation treated with especial Regard to Discontinuity in the Origin of Species. MacMillan & Co., London, 1894, pp. 598.